Approved USA Standards

On June 24, 1968, the United States of America Standards Institute approved four new USA Standards. These standards, dealing specifically with the super 8 system, are: PH22.156, Specifications for Camera Usage of Super 8 Motion-Picture Film Perforated One Edge; PH22.161, Dimensions of Magnetic Striping of Super 8 Motion-Picture Film Perforated 1R-1667; PH22.162, Dimensions of Magnetic Striping of 16mm Motion-Picture Film Perforated Super 8, 2R-1667 (1-4); PH22.163, Dimensions of Magnetic Striping of 35mm Motion-Picture Film Perforated Super 8, 5R-1667.

Inasmuch as compliance with USA Standards is purely voluntary, these standards will become truly effective only when broad publicity is given to their existence. USASI and the SMPTE would appreciate any personal influence to promote the use of these standards where such action is appropriate and proper. Copies of the Standards may be obtained for a nominal fee from the United States of America Standards Institute, 10 E. 40th Street, New York City, 10016.

Approved SMPTE Recommended Practices

On July 24, 1968 the Society's Board of Governors approved four Recommended Practices, which are printed here for your information: RP 16, Specifications of Tracking Control Record for 2-In. Quadruplex Video Magnetic Tape Recordings, RP 29, Video Test Tape for Video Magnetic Tape Recorders Operating at 15 IPS and Practice LBM of RP 6; RP 30, Video Test Tape for Video Magnetic Tape Recorders Operating at 7.5 IPS and Practice LBM of RP 6; RP 31, Video Test Tape for Video Magnetic Tape Recorders Operating at 15 IPS and Practice LBC of RP 6.

Copies of these documents and all SMPTE Recommended Practices may be acquired from Society Headquarters upon request.

Proposed Recommended Practices

Two Proposed Recommended Practices are published here for a trial period and public review. Proposed Recommended Practice RP 33, Specifications for 35mm Subjective Picture Test Film for Theaters and Review Rooms, describes a film which was designed to permit the non-technical individual to judge 35mm projection conditions. It is not intended to replace any of the currently available test films. Proposed Recommended Practice RP 34, Dimensions for 16mm Motion-Picture Projector Spindles is a new document which replaces USA Standard PH22.50-1960. The dimensions should be carefully reviewed by all those concerned with 16mm equipment design.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to October 20, 1968. If no adverse criticism is received by this date, the Proposed Recommended Practices will be submitted to the SMPTE Board of Governors for final approval.

Proposed Withdrawal of USA Standard

The 16 and 8mm Committee and the SMPTE Standards Committee have proposed the withdrawal of USA Standard Reel Spindles for 16mm Motion-Picture Projectors, PH22.50-1960. They feel it would be more appropriate to document this subject as a recommended practice. This new document is published here as RP 34.

The Standard was published in the December 1952 issue of the *Journal*. The recommendation will be submitted to USA Standards Committee PH22 of the USA Standards Institute. Any comments received from *Journal* publication will be reviewed prior to conclusion of action by that Committee.—*A.E.A.*

USA standard

Approved June 24, 1968

USAS
PH22.156–1968

Sponsor
Society of Motion Picture and Television Engineers, Inc.

Specifications for

Camera Usage of Super 8 Motion-Picture Film Perforated One Edge

1. Scope

This standard specifies the position of the emulsion, the rate of exposure, and the orientation of the area being exposed for super 8 motion-picture film perforated one edge.

2. Position of Film for Exposure

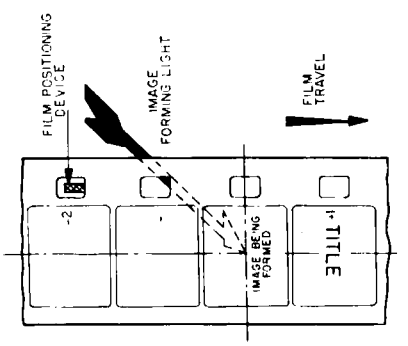
2.1 Except for special processes, the emulsion shall be toward the camera lens.

2.2 The perforation used for the film-positioning device should be two perforations above the perforation adjacent to the image being formed when a positioning device is at the bottom of its stroke (the –2 position). This location coincides with the vertical positioning device location required for the projected image and thereby improves steadiness through cancellation.

2.3 The dimensions of the camera aperture image relative to the film-positioning perforation shall be as specified in USA Standard Dimensions of Camera Aperture Image on Super 8 Motion-Picture Film, PH22.157-1967.

3. Rate of Exposure

The usual rate of exposure shall be 18 frames per second for silent film and 24 frames per second for sound film.



Film as seen from inside camera looking toward lens

Appendix

(This Appendix is not a part of this USA Standard, but is included to facilitate its use.)

A1. The usual rate of 18 frames per second for silent film specified in Section 3 conforms to the projection rate of 18 frames per second specified in USA Standard Specifications for Projector Usage of Super 8 Motion-Picture Film, PH22.155-1967.

A2. The sound speed recommendation of 24 frames per second (Section 3) is primarily intended for professional application of super 8 sound motion-picture photography. It is expected that the nonprofessional, in using single-system sound or in using post-processed magnetically striped film, will record his sound at 18 frames per second, as limited by the speed of his original photography or his desire to conserve film stock.

USA standard

Approved June 24, 1968

Dimensions of

USAS
PH22.161–1968

Sponsor
Society of Motion Picture and Television Engineers, Inc.

Magnetic Striping of Super 8 Motion-Picture Film Perforated 1R-1667

1. Scope

This standard specifies the location and dimensions of the magnetic recording stripe and the balance stripe applied to 8mm motion-picture film with one row of super 8 perforations.

2. Dimensions

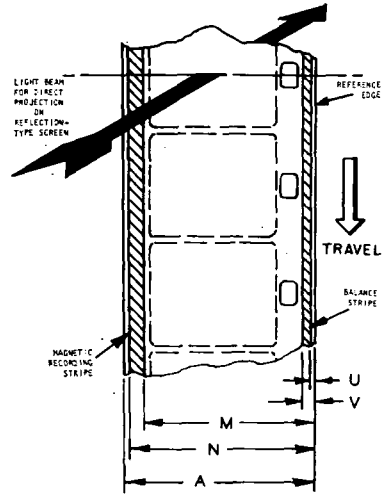
2.1 The location and dimensions of the magnetic recording stripe and the balance stripe shall be as given in the figure and table.

2.2 The magnetic stripe shall be on the side of the film which will be toward the light source when used on a projector arranged for direct front projection on a reflection-type screen.

2.3 The magnetic stripe shall be adjacent to the unperforated edge and is intended for the sound record. The narrow stripe adjacent to the perforated edge is a balance stripe. The balance stripe may be a stripe of magnetic or nonmagnetic material of such thickness that the balance and recording stripes project above the surface of the film to substantially the same degree.

3. Film Stock

The film stock used shall be safety type, cut and perforated in accordance with USA Standard Dimensions for 8mm Motion-Picture Film, Perforated Super 8, 1R-1667, PH22.149-1967.



Film As Seen Looking Toward Lens

Dimensions	Inches	Millimeters
A	0.314 nom	7.98 nom
M	0.285 ± 0.003	7.24 ± 0.08
N	0.312 ± 0.003	7.92 ± 0.08
U	0.003 ± 0.003	0.08 ± 0.08
V	0.015 ± 0.003	0.38 ± 0.08

USA standard

Approved June 24, 1968

Dimensions of

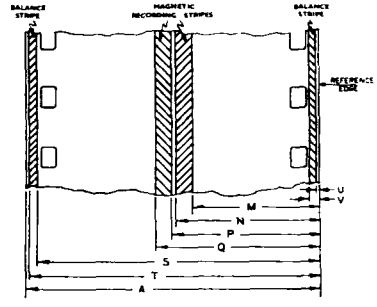
USAS
PH22.162–1968

Sponsor
Society of Motion Picture and Television Engineers, Inc.

Magnetic Striping of 16mm Motion-Picture Film Perforated Super 8, 2R-1667 (1-4)

1. Scope

This standard specifies the location and dimensions of the magnetic recording stripe and the balance stripes applied to 16mm motion-picture film with two rows of super 8 perforations in positions 1 and 4.



Dimensions	Inches	Millimeters
A	0.628 nom	15.95 nom
M	0.285 ± 0.002	7.24 ± 0.05
N	0.312 ± 0.002	7.92 ± 0.05
P*	0.316 ± 0.002	8.02 ± 0.05
Q	0.343 ± 0.002	8.71 ± 0.05
S	0.613 ± 0.003	15.57 ± 0.08
T	0.625 ± 0.003	15.88 ± 0.08
U	0.003 ± 0.003	0.08 ± 0.08
V	0.015 ± 0.003	0.38 ± 0.08

* The millimeter conversion is approximate so that Dimension P minimum equals Dimension N maximum.

2. Dimensions

2.1 The location and dimensions of the magnetic recording stripes and balance stripes shall be as given in the figure and table.

2.2 The magnetic striping material shall be applied to the surface of the film away from a camera or projector lens; for example, toward the light source of a projector arranged for direct front projection on a reflection-type screen.

2.3 The stripes designated as "recording" are made of a magnetic material and are intended for the sound record. The stripes between the edge of the film and the perforations are the balance stripes. The balance stripes may be stripes of magnetic or nonmagnetic material of such thickness that the balance and recording stripes project above the surface of the film to substantially the same degree.

3. Film Stock

The film stock used shall be safety type, cut and perforated in accordance with Draft USA Standard Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-4), PH22.-167.

NOTE: Tolerances for the recording stripes are specified to permit usage of a single wide stripe or two separate stripes. If two stripes are used, the amount of separation between the stripes should be sufficient to permit slitting within the requisites of the standard without obtaining undesirable feather edges of magnetic material. The separation required is determined by laboratory practice.

USAS
PH22.163–1968

Sponsor
Society of Motion Picture
and Television Engineers, Inc.

USA standard

Approved June 24, 1968

Dimensions of

Magnetic Striping of 35mm Motion-Picture Film Perforated Super 8, 5R-1667

1. Scope

This standard specifies the location and dimensions of the magnetic recording stripes and the balance stripes applied to 35mm motion-picture film with four rows of super 8 perforations and one row of special perforations.

2. Dimensions

2.1 The location and dimensions of the magnetic recording stripes and balance stripes shall be as given in the figure and table.

2.2 The magnetic striping material shall be applied to the surface of the film away from a camera or projector lens; for example, toward the light source of a projector arranged for direct front projection on a reflection-type screen.

2.3 The stripes designated as "recording" are made of a magnetic material and are intended for the sound record. The balance stripes may be stripes of magnetic or nonmagnetic material of such thickness that the balance and recording stripes project above the surface of the film to substantially the same degree.

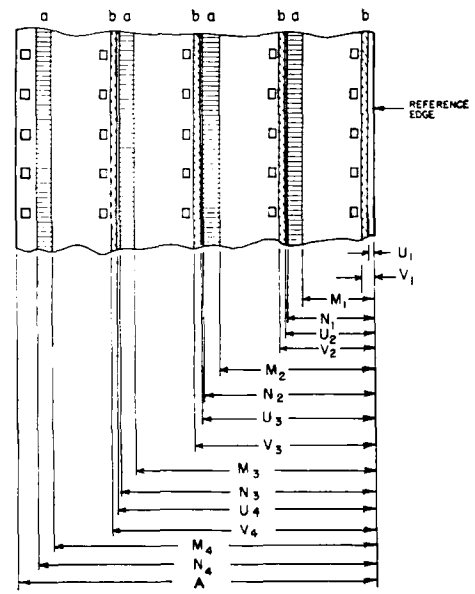
3. Film Stock

The film stock used shall be safety type, cut and perforated in accordance with Draft USA Standard Dimensions for 35mm Motion-Picture Film Perforated Super 8, 5R-1667, PH22.165.

NOTE 1: The width and edge-to-perforation distance of the 8mm slit strip shall be in accordance with Draft USA Standard Dimensions for 35mm Motion-Picture Film Perforated Super 8, 5R-1667, PH22.165. The location of the magnetic recording and balance stripes shall be in accordance with USA Standard Dimensions of Magnetic Striping of Super 8 Motion-Picture Film Perforated 1R-1667, PH22.161-1968. Consequently, it is not possible to take full advantage of the tolerances of both the slit width and the location of the magnetic recording and balance stripes.

NOTE 2: Tolerances for the recording stripes and balance stripes are specified to permit usage of a single wide stripe or two separate stripes where they are adjacent. If two stripes are used, the amount of separation between the stripes should be sufficient to permit slitting within the requisites of the standard without obtaining undesirable feather edges of magnetic material. The separation required is determined by laboratory practice.

(a) MAGNETIC RECORDING STRIPES (b) BALANCE STRIPES



Dimensions	Inches		Millimeters	
A	1.377	nom	34.98	nom
M_1	0.315 ±	0.002	8.00 ±	0.05
M_2	0.629 ±	0.002	15.98 ±	0.05
M_3	0.943 ±	0.002	23.95 ±	0.05
M_4	1.257 ±	0.002	31.93 ±	0.05
N_1	0.342 ±	0.002	8.69 ±	0.05
N_2	0.656 ±	0.002	16.66 ±	0.05
N_3	0.970 ±	0.002	24.64 ±	0.05
N_4	1.284 ±	0.002	32.61 ±	0.05
U_1	0.033 ±	0.003	0.84 ±	0.08
U_2	0.347 ±	0.003	8.81 ±	0.08
U_3	0.661 ±	0.003	16.79 ±	0.08
U_4	0.975 ±	0.003	24.76 ±	0.08
V_1	0.045 ±	0.003	1.14 ±	0.08
V_2	0.359 ±	0.003	9.12 ±	0.08
V_3	0.673 ±	0.003	17.09 ±	0.08
V_4	0.987 ±	0.003	25.07 ±	0.08

SMPTE RECOMMENDED PRACTICE — RP 16–1968

Specifications of Tracking Control Record for 2-In. Quadruplex Video Magnetic Tape Recordings

1. *Scope*

This recommended practice specifies the recorded dimensional relationships among (a) tracking-control signal, (b) frame-pulse signal, and (c) vertical synchronizing signal for 2-in. quadruplex video magnetic tape recordings.

2. *Dimensions*

2.1 The dimensional relationships among the tracking control record, frame pulse record, and video record, not specified elsewhere in this practice, shall be as specified in Figs. 1a and 1b and in the table.

2.2 Dimensions pertaining to the video, audio, and control records on 2-in. magnetic tape shall be as specified in USA Standard Dimensions of Video, Audio, and Tracking Control Records on 2-in. Video Magnetic Tape, C98.6-1965.

3. *Magnetic Coating*

With the direction of tape motion shown, the magnetic coating is on the surface facing the observer.

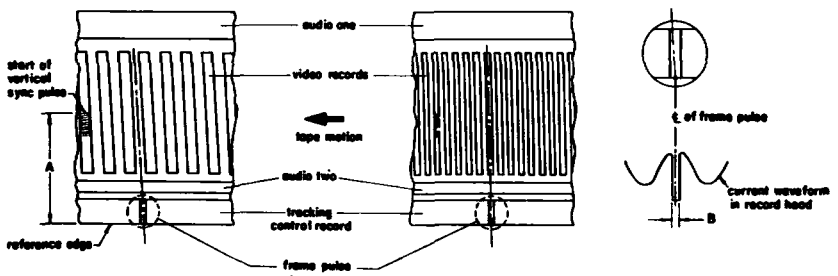


Fig. 1a. 15 in./sec

Fig. 1b. 7.5 in./sec

Fig. 1c. Enlargement of Frame Pulse Area

Dimensions	Inches Minimum	Inches Maximum	Millimeters Minimum	Millimeters Maximum	Microseconds
A	1.135	1.165	28.83	29.59	
B					60 ± 10*

* Measured at 50 percent amplitude points. Widths observable and measurable on developed tape will vary with recording level and properties of developing solution.

Revision of RP 16–1964
Approved July 1968

4. *Frame Pulse*

4.1 A pulse to identify the position of the vertical synchronizing pulse shall be superimposed on the tracking control signal.

4.2 One pulse shall be recorded per television frame to identify the vertical blanking interval that is preceded by a full horizontal line when the tape is recorded at 15 in./sec and to identify the vertical blanking interval that is preceded by a half horizontal line when the tape is recorded at 7.5 in./sec.

4.3 The pulse shall be positioned so that the centerline of the recorded pulse and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed (Fig. 1a). The pulse shall be positioned so that the centerline of the fifth video track after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed (Fig. 1b).

4.4 The amplitude of the frame pulse current shall be greater than 150 percent of the peak-to-peak value of the tracking control signal current in the record head.

4.5 The polarity of the pulse with respect to the tracking control signal shall be as shown in Fig. 1a.

5. *Tracking Control Signal*

5.1 The frequency of the tracking-control signal shall be four times the field frequency of the television video signal.

5.2 The amplitude of the tracking-control signal current in the recording head shall be such that the tape is driven to the verge of saturation. This amplitude can be established by the method described in the Appendix.

5.3 The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed.

The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the fifth video track after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed.

5.4 The point of maximum record current coinciding with the frame pulse shall be one that immediately follows an area on the control record to which a south-seeking pole of a compass will be attracted.

5.5 The wave shape of the tracking-control signal current in the record head should be sinusoidal.

Appendix

(This Appendix is not a part of this SMPTE Recommended Practice, but is included to facilitate its use.)

1. The transfer characteristic of magnetic tape is nonlinear. The B_r, I_r curve of the tape as recorded has a shape indicated in Fig. 2a. When a sinusoidal record current (Fig. 2c) is applied to the record head, the resulting recorded flux density is as shown in Fig. 2b. The playback voltage waveform (Fig. 2d) is the first derivative of the recorded flux. Thus, the zero axis crossing region of the reproducing signal corresponds to the maximum recorded flux region. The verge of saturation is considered to be the condition where the recorded flux waveform is just noticeably flattened on its peaks. This flattening of the flux peaks results in an inflection in the reproducing signal waveform in the zero axis crossing region. The verge of saturation can thus be determined by increasing the record current until a just perceptible inflection occurs in the zero axis crossing region of the reproducing signal.

2. Areas to which a compass is attracted (see Section 5.4) do not coincide with point of maximum record current. The compass will be attracted to two areas (X, as shown in Fig. 2) adjacent to the point where the record current crosses the zero axis. The two areas will appear as bars when the track is developed with carbonyl iron or an equivalent material.

3. The location of vertical sync and the frame pulse, as specified herein, will apply only if the recorded video head and capstan servos are referenced to a synchronizing signal that is in time coincidence with the video at the recorder.

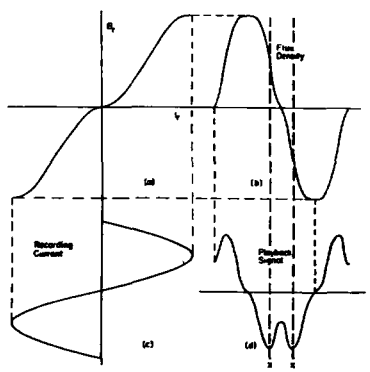


Fig. 2

SMPTE RECOMMENDED PRACTICE — RP 29–1968

Video Test Tape for Quadruplex Video Frequency Magnetic Tape Recorders Operating at 15 In./s and Practice LBM of SMPTE Recommended Practice RP 6

1. *Scope*

This recommended practice specifies a video frequency test tape to be used with quadruplex television video tape recorders operating at 15 in./s and in accordance with practice LBM of SMPTE Recommended Practice for Reference Carrier Frequencies and De-Emphasis Characteristics for 2-In. Quadruplex Video Magnetic Tape Recording, RP 6-1967. The tape is to be used for:

(a) Positioning of the vacuum guide.

(b) Indication of video frequency response characteristics of the reproducing system.

(c) Adjustment of gain of the video reproducing system.

(d) Comparison of carrier frequencies of the video recording system.

(e) Verification of level and phase of the control track recording system.

(f) Adjustment of the gain of the program audio reproducing system.

2. *General Specifications*

2.1 Dimensions of Records. The dimensions of pertinent records constituting this test tape shall conform to USA Standard Dimensions of Video, Audio, and Control Track Records on 2-In. Video Magnetic Tape, C98.6-1965.

2.2 Tape Speed. The nominal linear speed of this test tape shall be 15 in./s in accordance with USA Standard Speed of 2-In. Video Magnetic Tape, C98.4-1963.

2.3 Tape Stock. The test sections shall be recorded on transversely-oriented television magnetic recording tape optimized for use with Practice LBM of SMPTE Recommended Practice RP 6. The dimensions of the tape stock shall be as specified in USA Standard Dimensions of 2-In. Video Magnetic Tape, C98.1-1965.

2.4 Tracking Control Signal. A tracking control signal, conforming to that in SMPTE Recommended Practice for Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings, RP 16-1964, shall be recorded throughout the tape.

2.5 Voice announcement at the beginning of this test tape shall provide identification of the applicable recommended practice and manufacturer. Voice announcements shall be recorded at a level approximately 5 dB below reference level as defined in Section 3.1.2 of Draft USA Standard Specifications for an Audio Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 15 In./s, C98.8. Announcement shall be recorded on Audio Record No. 1 only. A video identification may be included during the voice announcement section. If no video identification signal is used, sync, sync and set up, or test signal shall be recorded on the video channel during the voice announcement.

2.6 Recorded carrier frequencies shall conform to those specified by Practice LBM of SMPTE Recommended Practice RP 6; recording pre-emphasis shall be the complement of the de-emphasis characteristic specified by Practice LBM of SMPTE Recommended Practice RP 6.

2.7 Tape vacuum guide radius and position shall conform to SMPTE Recommended Practice for Tape Vacuum Guide Radius and Position for 2-In. Quadruplex Video Magnetic Tape Recording, RP 11-1968.

2.8 Audio record shall be in accordance with USA Standard Specifications of the Audio Records for 2-In. Video Magnetic Tape Recordings, C98.3-1963.

2.9 Video synchronizing waveforms and signal amplitudes shall conform to EIA Standard Monochrome Television Studio Facilities, RS 170-1957. The timing of the synchronizing waveform shall be uninterrupted during the transition from the identification signals specified in Section 2.5 to the video test signal specified in Section 3.1.

2.10 Geometric distortion on the test tape caused by lack of exact 90° angular separation (quadrature error) of the transducers on the video head wheel making the recording shall not exceed 0.03 microseconds peak to peak.

Approved July 1968

3. *Test Section*

3.1 Video Test Signal. A test signal conforming to SMPTE Recommended Practice for Signal Specifications for a Monochrome Video Alignment Tape for 2-In. Video Magnetic Tape Recording, RP 10-1962, shall be used.

3.2 Audio Test Signal. A 1,000 Hz ± 5 percent tone shall be recorded at reference level ± ½ dB throughout the test section on Audio Record No. 1 only, except as interrupted for the announcements defined in Section 3.1.

3.3 Duration. The test section duration shall be at least five minutes.

3.4 Voice Announcement. A voice announcement identifying the tape shall be recorded at one-minute intervals under the same conditions as stated in Section 2.5 except that the video test signal shall not be interrupted.

4. *Calibration*

4.1 Calibration of audio level on all test tapes for field use shall be accomplished by comparison on a calibrated reproducer with a primary audio reference level recording made in accordance with Draft USA Standard Specifications for a Primary Audio Reference Level Recording for Quadruplex Video Magnetic Tape Recorders Operating at 15 In./s, C98.7.

4.2 Audio Level Measurements. All level measurements shall be made by means of a vu meter, as specified in USA Standard Volume Measurements of Electrical Speech and Program Waves, C16.5-1951 (Reaffirmed 1961).

4.3 Video Level Measurements. All video measurements of luminance levels shall be made in accordance with USA Standard Method of Measurement of Television Luminance Signal Levels, C16.31-1959.

Note: The frequency response of a recovered video signal is a function of such variables as recording current and type of tape stock used; therefore, the optimum reproducing-equalization setting for this tape will not necessarily be the optimum reproducing-equalization setting for all other recordings.

SMPTE RECOMMENDED PRACTICE — RP 30-1968

Video Test Tape for Quadruplex Video Frequency Magnetic Tape Recorders Operating at 7.5 In./s and Practice LBM of SMPTE Recommended Practice RP 6

1. *Scope*

This recommended practice specifies a video frequency test tape to be used with quadruplex television video tape recorders operating at 7.5 in./s and in accordance with practice LBM of SMPTE Recommended Practice for Reference Carrier Frequencies and De-Emphasis Characteristics for 2-In. Quadruplex Video Magnetic Tape Recording, RP 6-1967. The tape is to be used for:

(a) Positioning of the vacuum guide.

(b) Indication of video frequency response characteristics of the reproducing system.

(c) Adjustment of gain of the video reproducing system.

(d) Comparison of carrier frequencies of the video recording system.

(e) Verification of level and phase of the control track recording system.

(f) Adjustment of the gain of the program audio reproducing system.

2. *General Specifications*

2.1 Dimensions of Records. The dimensions of pertinent records constituting this test tape shall conform to USA Standard Dimesions of Video, Audio, and Control Track Records on 2-In. Video Magnetic Tape, C98.6-1965.

2.2 Tape Speed. The nominal linear speed of this test tape shall be 7.5 in./s in accordance with USA Standard Speed of 2-In. Video Magnetic Tape, C98.4-1963.

2.3 Tape Stock. The test sections shall be recorded on transversely-oriented television magnetic recording tape optimized for use with Practice LBM of SMPTE Recommended Practice RP 6. The dimensions of the tape stock shall be as specified in USA Standard Dimensions of 2-In. Video Magnetic Tape, C98.1-1963.

2.4 Tracking Control Signal. A tracking control signal, conforming to that in SMPTE Recommended Practice for Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings, RP 16-1964, shall be recorded throughout the tape.

2.5 Voice announcement at the beginning of this test tape shall provide identification of the applicable recommended practice and manufacturer. Voice announcements shall be recorded at a level approximately 5 dB below reference level as defined in Section 3.1.2 of Draft USA Standard Specifications for an Audio Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 7.5 In./s, C98.11. Announcement shall be recorded on Audio Record No. 1 only. A video identification may be included during the voice announcement section. If no video identification signal is used, sync, sync and set up, or test signal shall be recorded on the video channel during the voice announcement.

2.6 Recorded carrier frequencies shall conform to those specified by Practice LBM of SMPTE Recommended Practice RP 6; recording pre-emphasis shall be the complement of the de-emphasis characteristic specified by Practice LBM of SMPTE Recommended Practice RP 6.

2.7 Tape vacuum guide radius and position shall conform to SMPTE Recommended Practice for Tape Vacuum Guide Radius and Position for 2-In. Quadruplex Video Magnetic Tape Recording, RP 11-1968.

2.8 Audio record shall be in accordance with USA Standard Specifications of the Audio Records for 2-In. Video Magnetic Tape Recordings, C98.3-1963.

2.9 Video synchronizing waveforms and signal amplitudes shall conform to EIA Standard Monochrome Television Studio Facilities, RS 170-1957. The timing of the synchronizing waveform shall be uninterrupted during the transition from the identification signals specified in Section 2.5 to the video test signal specified in Section 3.1.

Approved July 1968

2.10 Geometric distortion on the test tape caused by lack of exact 90° angular separation (quadrature error) of the transducers on the video head wheel making the recording shall not exceed 0.03 microseconds peak to peak.

3. *Test Section*

3.1 Video Test Signal. A test signal conforming to SMPTE Recommended Practice for Signal Specifications for a Monochrome Video Alignment Tape for 2-In. Video Magnetic Tape Recording, RP 10-1962, shall be used.

3.2 Audio Test Signal. A 1,000 Hz ± 5 percent tone shall be recorded at reference level ± ½ dB throughout the test section on Audio Record No. 1 only, except as interrupted for the announcements defined in Section 3.4.

3.3 Duration. The test section duration shall be at least five minutes.

3.4 Voice Announcement. A voice announcement identifying the tape shall be recorded at one-minute intervals under the same conditions as stated in Section 2.5 except that the video test signal shall not be interrupted.

4. *Calibration*

4.1 Calibration of audio level on all test tapes for field use shall be accomplished by comparison on a calibrated reproducer with a primary audio reference level recording made in accordance with Draft USA Standard Specifications for a Primary Audio Reference Level Recording for Quadruplex Video Magnetic Tape Recorders Operating at 7.5 In./s, C98.10.

4.2 Audio Level Measurements. All level measurements shall be made by means of a vu meter, as specified in USA Standard Volume Measurements of Electrical Speech and Program Waves, C16.5-1954 (Reaffirmed 1961).

4.3 Video Level Measurements. All video measurements of luminance levels shall be made in accordance with USA Standard Method of Measurement of Television Luminance Signal Levels, C16.31-1959.

Note: The frequency response of a recovered video signal is a function of such variables as recording current and type of tape stock used; therefore, the optimum reproducing-equalization setting for this tape will not necessarily be the optimum reproducing-equalization setting for all other recordings.

SMPTE RECOMMENDED PRACTICE — RP 31–1968

Video Test Tape for Quadruplex Video Frequency Magnetic Tape Recorders Operating at 15 In./s and Practice LBC of SMPTE Recommended Practice RP 6

1. *Scope*

This recommended practice specifies a video frequency test tape to be used with quadruplex television video tape recorders operating at 15 in./s and in accordance with practice LBC of SMPTE Recommended Practice for Reference Carrier Frequencies and De-Emphasis Characteristics for 2-In. Quadruplex Video Magnetic Tape Recordings, RP 6-1967. The tape is to be used for:

(a) Positioning of the vacuum guide.

(b) Indication of video frequency response characteristics of the reproducing system.

(c) Adjustment of gain of the video reproducing system.

(d) Comparison of carrier frequencies of the video recording system.

(e) Verification of level and phase of the control track recording system.

(f) Adjustment of the gain of the program audio reproducing system.

2. *General Specifications*

2.1 Dimensions of Records. The dimensions of pertinent records constituting this test tape shall conform to USA Standard Dimesions of Video, Audio, and Control Track Records on 2-In. Video Magnetic Tape, C98.6-1965.

2.2 Tape Speed. The nominal linear speed of this test tape shall be 15 in./s in accordance with USA Standard Speed of 2-In. Video Magnetic Tape, C98.4-1963.

2.3 Tape Stock. The test sections shall be recorded on transversely-oriented television magnetic recording tape optimized for use with Practice LBC of SMPTE Recommended Practice RP 6. The dimensions of the tape stock shall be as specified in USA Standard Dimensions of 2-In. Video Magnetic Tape, C98.1-1963.

2.4 Tracking Control Signal. A tracking control signal, conforming to that in SMPTE Recommended Practice for Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings, shall be recorded throughout the tape.

2.5 Voice announcement at the beginning of this test tape shall provide identification of the applicable recommended practice and manufacturer. Voice announcements shall be recorded at a level approximately 5 dB below reference level as defined in Section 3.1.2 of Draft USA Standard Specifications for an Audio Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 15 In./s, C98.8. Announcement shall be recorded on Audio Record No. 1 only. A video identification may be included during the voice announcement section. If no video identification signal is used, sync, sync and set up, or test signal shall be recorded on the video channel during the voice announcement.

2.6 Recorded carrier frequencies shall conform to those specified by Practice LBC of SMPTE Recommended Practice RP 6; recording pre-emphasis shall be the complement of the de-emphasis characteristic specified by Practice LBC of SMPTE Recommended Practice RP 6.

2.7 Tape vacuum guide radius and position shall conform to SMPTE Recommended Practice for Tape Vacuum Guide Radius and Position for 2-In. Quadruplex Video Magnetic Tape Recording, RP 11-1968.

2.8 Audio record shall be in accordance with USA Standard Specifications of the Audio Records for 2-In. Video Magnetic Tape Recordings, C98.3-1963.

2.9 Video synchronizing waveforms and signal amplitudes shall conform to the rules and regulations of the Federal Communications Commission for color transmissions. Color subcarrier synchronizing burst shall be included throughout the recording. The timing of the synchronizing waveforms shall be uninterrupted during the transition from the identification signals specified in Section 2.5 to the video test signals specified in Section 3.1, and shall be uninterrupted during the transitions between video test signals specified in Section 3.1.

2.10 Geometric distortion on the test tape caused by lack of exact 90° angular separation (quadrature error) of the transducers on the video head wheel making the recording shall not exceed 0.03 microseconds peak to peak.

Approved July 1968

3. *Test Section*

3.1 Video Test Signals. Two test signals shall be recorded in sequence.

3.1.1 The first test section signal shall conform to SMPTE Recommended Practice RP 10, Video Alignment Signal Specification for Quadruplex Video Magnetic Tape Recording, except for the synchronizing signals defined by Section 2.9.

3.1.2 The second test section signal shall be encoded color bars conforming to EIA Standard Encoded Color Bar Signals, RS-189-1957.

3.2 Audio Test Signal. A 1,000 Hz ± 5 percent tone shall be recorded at reference level ± ½ dB throughout the test section on Audio Record No. 1 only, except as interrupted for the announcements defined in Section 3.4.

3.3 Duration. The test section duration shall be at least ten minutes; five minutes minimum for each signal described in Section 3.1.

3.4 Voice Announcement. A voice announcement identifying the tape shall be recorded at one-minute intervals under the same conditions as stated in Section 2.5 except that the video test signal shall not be interrupted.

4. *Calibration*

4.1 Calibration of audio level on all test tapes for field use shall be accomplished by comparison on a calibrated reproducer with a primary audio reference level recording made in accordance with Draft USA Standard Specifications for a Primary Audio Reference Level Recording for Quadruplex Video Magnetic Tape Recorders Operating at 15 In./s, C98.7.

4.2 Audio Level Measurements. All level measurements shall be made by means of a vu meter, as specified in USA Standard Volume Measurements of Electrical Speech and Program Waves, C16.5-1954 (Reaffirmed 1961).

4.3 Video Level Measurements. All video measurements of luminance levels shall be made in accordance with USA Standard Method of Measurement of Television Luminance Signal Levels, C16.31-1959.

Note: The frequency response of a recovered video signal is a function of such variables as recording current and type of tape stock used; therefore, the optimum reproducing-equalization setting for this tape will not necessarily be the optimum reproducing-equalization setting for all other recordings.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 33

Specifications for 35mm Subjective Picture Test Film for Theaters and Review Rooms

Introduction

There are several excellent test films available for the evaluation of projection conditions in the theater and review room. These films, however, were designed to be comprehensive and quantitative in text for the evaluation and correction of specific projection problems, and can best be utilized by technicians and engineers.

The Subjective Picture Test Film, specified herein, has been designed to allow non-technical personnel to evaluate projection conditions in a simple manner that does not require a technical background. A sound narration accompanies the visual text and describes the evaluation procedure. This film is not intended to replace other test films now available to the technician and engineer.

The focus test chart is designed to evaluate the optical and mechanical performance of the projection equipment, and the color chart is designed to indicate the amount of available film image being projected on the screen.

1. *Scope*

1.1 This recommended practice specifies the subject material and the dimensions and location of the subject material for a 35mm test film to assist the user in evaluating and adjusting projection conditions.

1.2 This recommended practice also specifies the motion-picture film materials and densitometry necessary to produce the original test film negatives and projection prints.

1.3 This recommended practice further specifies the conditions for the proper use of the test film.

1.4 This recommended practice further suggests a narration to accompany the visual text.

2. *Dimensions*

2.1 The dimensions of the two test charts and the location of their subject material shall be as specified in Figs. 1 and 2.

2.1.1 The exposure test chart, Fig. 3, shall comprise black-and-white patches matching in reflection density similar areas on the focus test chart and a nominal 18 percent reflection gray patch for contrast and density control. The exposure test chart is designed to aid in the making of the original negative and release prints. The dimension requirements are subject only to the size of a readable area needed by the sensitometric equipment.

3. *Description*

3.1 The focus test chart shall be photographed as a 35mm camera original negative on a fine-grain, variable-area sound recording film manufactured in accordance with USA Standard Dimesions for 35mm Motion-Picture Film, BH-1866, PH22.93-1964.

3.1.1 A properly exposed and processed negative shall produce approximate density readings of 2.73 on the white patches, 0.26 on the black patches, and 0.52 on the central gray patch of the exposure test chart, Fig. 3.

3.2 The color chart shall be photographed as a 35mm camera original negative on a color negative film made in accordance with USA Standard Dimensions for 35mm Motion-Picture Film, BH-1866, PH22.93-1964.

3.3 The charts shall be photographed with a Style B camera aperture, as specified in USA Standard Dimensions of 35mm Motion-Picture Camera Aperture Images, PH22.59-1966.

3.4 The test film shall be produced as a 35mm print on color positive-type motion-picture stock manufactured in accordance with USA Standard Dimensions for 35mm Motion-Picture Film, DH-1870, PH22.1-1964.

3.4.1 Cancellation of the image spread on the focus test chart (i.e. reproduction of the target checkerboard as sharp-edged squares, just contacting at the corners and free of barrel or hourglass distortion) has been observed when the neutral print densities of the exposure chart, Fig. 3, are as follows:

Black — 2.54
Gray — 1.84
White — 0.06

The exposure chart shall appear on not more than 6 frames in the integral leader of the final release prints.

3.5 The projection prints shall be made in accordance with USA Standard Dimensions of Exposed Areas for Picture and Photographic Sound on 35mm Motion-Picture Prints Made on Continuous Contact Printers, PH22.111-1965.

3.6 The descriptive narration shall be recorded and combined with approximately 250 ft each of negative footage from the two test charts (Figs. 1 and 2), in accordance with USA Standard Dimensions of Photographic Sound Record on 35mm Motion-Picture Prints, PH22.40-1967. (See Appendix.)

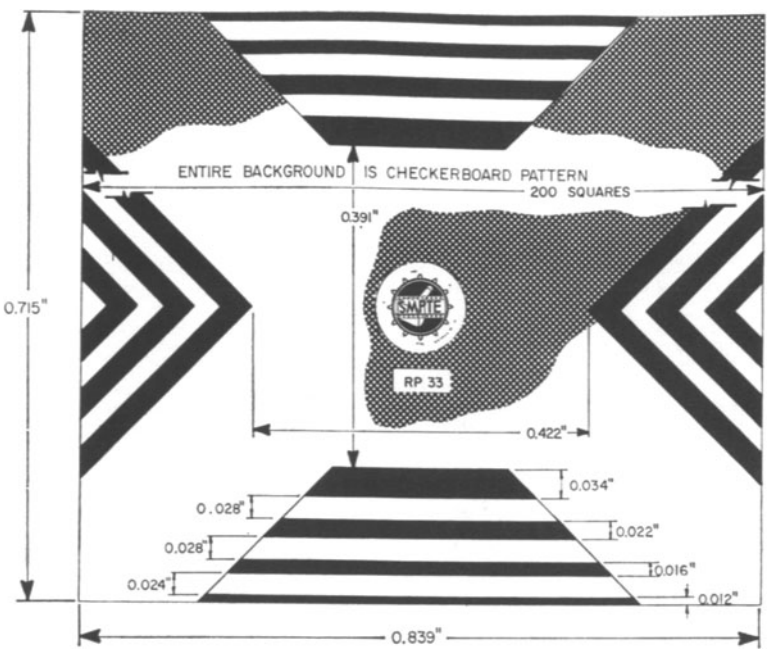


Fig. 1

Chevrons on each side are of equal width, 0.025 in.

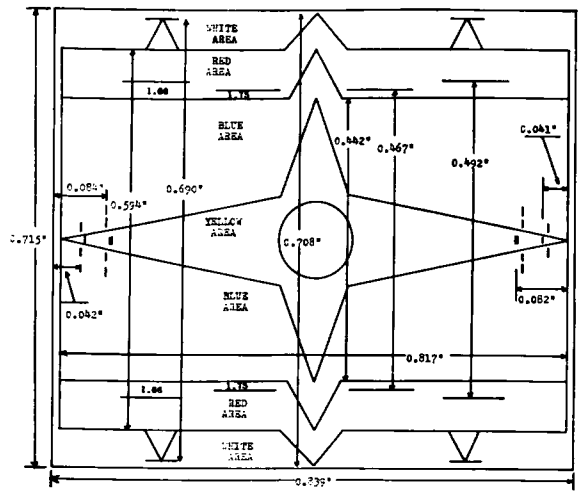


Fig. 2

All dimensions on this chart except 0.715" x 0.839", 0.042" and 0.084" are reduced by 1% to compensate for aperture plate edge effect.

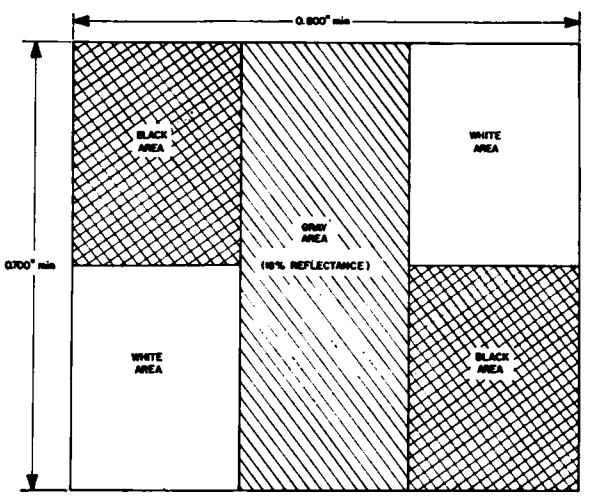


Fig. 3

Notes

Note 1. *Projection Conditions*

N1.1 The evaluation of the optical and mechanical performance of the projection equipment and the amount of available film image information being projected on the screen shall be ascertained by viewing the Subjective Picture Test Film on the screen using the proper projector aperture plate, lens, and screen masking as indicated in the accompanying narration.

N1.2 Anamorphic projection image areas are specified in USA Standard Dimensions of 35mm Motion-Picture Anamorphic Projected Image Area, 2.35:1 Aspect Ratio, PH22.106-1965. Nonanamorphic projection image areas are specified in USA Standard Aperture for 35mm Sound Motion-Picture Projectors, PH22.58-1954.

N1.3 Custom-made aperture plates, when used, should conform as closely as possible to the film image area and aspect ratio. Non-standard aperture plates cannot provide the proper screen image size unless the plate has been designed only to compensate for projection angle or "keystoning."

N1.4 Screen masking shall conform as closely as possible to the areas specified in N1.2.

Note 2. *Evaluation Procedure*

N2.1 The optical performance of the projection equipment shall be evaluated by observing the resolution of the checkerboard pattern of Fig. 1 on the screen. The pattern should appear sharply defined as black-and-white squares (rectangles when using anamorphic lenses). A slight fall off in definition may be observed toward the corners due to normal projection conditions.

N2.2 The mechanical performance of the projection equipment shall be evaluated by observing the upper and lower horizontal bars and the side chevron patterns on the test chart (Fig. 1).

A bleeding of white onto black, or vice versa, on the horizontal bars indicates travel ghost. The horizontal bars shall also be used to evaluate the amount of vertical unsteadiness on the screen image. The checkerboard pattern can be used to evaluate the amount of vertical motion where one square on the test chart indicates unsteadiness approximately 0.5 percent of the film image width.

The side chevron patterns shall be used to indicate the presence of lateral weave and to provide a simple guide to image centering on the screen. Lateral weave equal to one square in the checkerboard focus test pattern indicates unsteadiness of approximately 0.5 percent of the film image width.

N2.3 Anamorphic Aperture, 2.35:1. The maximum projectable image area for anamorphic projection is indicated by the white area in Fig. 2. When using the proper projector aperture plate, anamorphic lens, and screen masking, the red points on the chart should be just visible at the top and bottom of the screen and a white edge should be visible at both sides of the screen. The single and double vertical yellow marks near the edges of the chart on the blue area indicate a 10 and 20 percent loss in screen image width (5 and 10 percent on each side).

Because the trend has been toward a decrease in the height of the aperture, the 0.690 in. dimension is indicated as well as 0.715 in. The limits of the 0.690 in. dimension are the upper and lower horizontal black bars at the apexes of the red triangles.

N2.4 Sound Aperture, 1.38:1. The maximum projectable image area for projection is indicated by the red area in Fig. 2. When a sound aperture plate is used in conjunction with the proper lens and screen masking, the blue points should be just visible at the top and bottom of the screen, and the horizontal yellow points should be just visible at the edges of the screen. The single and double vertical black marks near the ends of the horizontal yellow points indicate a 10 and 20 percent loss in screen image width (5 and 10 percent on each side).

N2.5 Wide-Screen Aperture. The image area used for wide-screen projection is indicated by the blue area in Fig. 2. The substitution of the currently used wide-screen aperture plate of 1.85:1 should just reveal the yellow points at the top and bottom of the screen. The aperture plates designated as 1.75:1 and 1.66:1 should just show the horizontal yellow lines identified as such on the red area. In each case, the horizontal yellow points should just be visible at the edges of the screen.

Appendix

(This Appendix is not a part of this SMPTE Recommended Practice, but is included to facilitate its use.)

The following descriptive narration script is suggested for use with the Subjective Picture Test Film:

A1. The focus test chart that you are now viewing is designed for you to evaluate the efficiency of your projection system with the least effort.

A2. It is recommended that you examine the image from the center of the first row of seats on the main floor.

A3. If your projection equipment is operating properly, and has been regularly maintained, the checkerboard pattern should appear sharp and well defined. In some situations, the length of the projection throw might prevent critical focusing. In these cases, it would be desirable for the projectionist to use binoculars.

A4. If it is not possible to resolve sharply the small individual squares in the pattern as the projectionist goes through focus, the projection optics should be thoroughly checked, and the projection port glass should be cleaned. When sharp focus has been attained in the center of the screen, a gradual softening of the focus toward the corners of the image is sometimes apparent, but it should not cause concern if it is similar in all corners. When a good compromise focus between the center and the sides of the screen has been achieved, should one side of the screen appear less sharp than the other, the projector gate and projection lens alignment should be checked relative to each other and to the screen.

A5. The horizontal bars at the top and bottom of the screen are designed to check vertical unsteadiness. For best results, the evaluation should be made using a large aperture plate. An objectionable amount of unsteadiness may indicate a worn intermittent sprocket, improper gate tension, perforation damage, or improper film lubrication.

A6. These two panels are also useful in checking for travel ghost. If any white bars appear to be bleeding into the adjacent black areas, or vice versa, the shutter is not properly timed and it should be adjusted as specified in the projection manual.

A7. The two side panels are included to indicate lateral unsteadiness or weave. If the side-to-side weave is excessive or objectionable, the projector gate tension should be checked, along with the guide rails and the spring-loaded roller in the trap. The side panels can also be used as a simple guide to image centering on the screen.

A8. For proper evaluation of the color chart, the projectionist must center the image vertically on the screen as accurately as possible through the rotating of the framing adjustment of the projector. It is entirely possible that many situations exist where vertical displacements of optical centers result when shifting from one screen format to another and compensation made in custom aperture filing for the nonanamorphic (wide-screen) format. These conditions require framing adjustments between formats and the test film can alert exhibitors to the need for selective framing to provide good composition of picture information on nonanamorphic prints where the frame-line reference is above or below the limitations established by the aspect ratio in use.

A9. This color chart is designed to indicate the amount of available picture information lost on the screen by improper screen masking and structural limitations or by incorrect aperture plate sizes and lens focal length combinations.

A10. As you view the color chart, using the proper anamorphic lens and an aperture plate marked 2.35:1, if the screen masking is correct, the red points should be just visible at the top and bottom of the screen, and a vertical white edge should be seen at both sides of the screen. If these indicators are not visible, the screen masking is either incorrect or the projection lens focal length is too short. The single and double vertical yellow marks near the edges of the chart on the blue area indicate a 10 and 20 percent loss in screen image width (5 and 10 percent on each side).

A11. As current practice is toward a decrease in the height of the anamorphic-type aperture, a shorter dimension is being considered as a substitute for the standard 0.715 in. now in use. The limits of this dimension are the upper and lower horizontal black bars at the tips of the red triangles. If the screen image height reaches these marks, the condition is acceptable.

A12. If you are viewing the color chart using a standard sound aperture plate marked 1.38:1, along with the proper focal length lens, the blue points should be just visible at the top and bottom of the screen, and the horizontal yellow points should be just seen at the edges of the screen. Similarly, when using a wide-screen aperture plate marked 1.85:1, the vertical yellow points should be just seen at the top and bottom of the screen. Other wide-screen aperture plates, designated 1.75:1 and 1.66:1, should just reveal the horizontal yellow lines, as marked, on the red areas of the chart.

In each case, the horizontal yellow points should just be visible at the edges of the screen. The single and double vertical black marks near the ends of the horizontal yellow points indicate losses of 10 and 20 percent in screen image width (5 and 10 percent on each side).

A13. If your projected screen images are considerably oversized, longer focal length lenses are indicated. Small differences in screen image size should be corrected by adjusting the screen masking.

A14. Custom-made aperture plates should conform to the film image size as closely as possible. Film image dimensions are the result of original photography and printing designed to conform to the standard and commonly used aperture plates manufactured today.

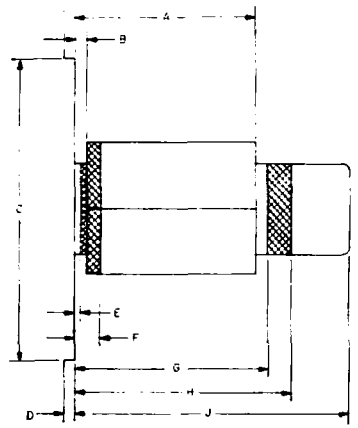
PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 34

Dimensions for 16mm Motion-Picture Projector Reel Spindles

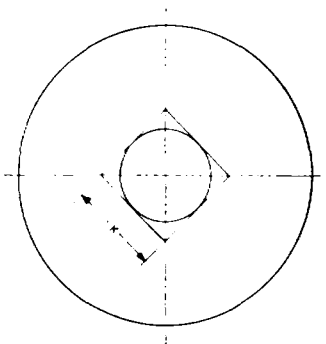
1. *Scope*

1.1 This recommended practice specifies the dimensions for 16mm motion-picture projector reel spindles.



2. *Dimensions*

2.1 The dimensions shall be as given in the figure and table.



Notes:

1. Dimension K represents the diameter of the round portion or length of a side of the square drive portion of the spindle shaft, excluding locking means.

   The figure illustrates the suggested construction for a projector spindle with a square drive portion. Alternate arrangements are also possible, providing that a minimum of two corners of the suggested square drive portion are maintained for drive and keying.

2. The area between Dimensions E and F and that between Dimensions G and H, illustrated by cross-hatching in the figure, represent the spindle shaft area, including a safety factor, on which the projection reel flange will rest. The minimum Dimension K applies only to these areas, although the maximum Dimension K applies to the entire shaft. The minimum shaft thickness dimension has been fixed for these areas to help minimize loose fit and resultant noise or tilt of reels.

3. The shape or action of the device for locking reels on spindles is optional, but the device should work against the full thickness of reels in the vicinity of the spindle holes, in accordance with USA Standard Dimensions for 16mm Motion-Picture Projection Reels (200- to 2,000-Ft Capacity), PH22.11-1966.

Dimensions	Inches	Millimeters
A	0.100 min	2.54 min
	0.665 max	16.89 max
B	0.010 max	0.25 max
C	0.63 min	16.0 min
	0.97 max	24.6 max
D	0.12 min	3.0 min
E*	0.005 max	0.13 max
F*	0.080 min	2.03 min
G*	0.710 max	18.03 max
H	0.850 min	21.59 min
J	0.980 min	24.89 min
K*	0.310 min	7.87 min
	0.315 max	8.00 max

*See Notes 1 and 2.